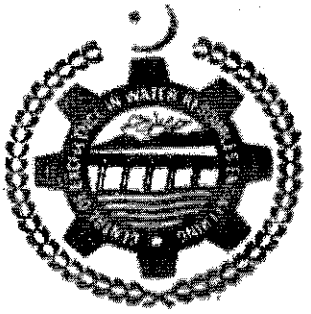
THESIS

SIMULATION OF SEDIMENT FLUSHING AT INTAKE STRUCTURE OF KOHALA HYDROPOWER PROJECT BY USING SSIIM MODEL



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ABSTRACT

This study was carried out to compute river and sediment flow and simulation of sediment flushing by using 3D numerical modeling. The proposed Kohala dam site was modeled by using numerical model program SSIIM. SSIIM stands for Simulation of Sediment movements in Water Intakes with Multiblock Option. The proposed dam site is situated 26 Km upstream of Muzafarabad near Siran nullah.

The average daily flow and sediment flow at dam site were analyzed by using 35 years data of Chinari and Hattian Bala gauging stations. The results show that average monthly flow at dam site is 312 cumecs and sediment load is 14000 tons/yr at dam site. The generated temporal distribution of the suspended sediment discharge is very well matching with discharge at dam site.

For simulation of sediment flushing at intake of Kohala Hydropower Project, SSIIM model was formulated for the study area. The grid was generated with the co-ordinate system 'i' 'j' and 'k' representing stream-wise (x-direction), cross stream-wise (y-direction) and vertical (z) direction respectively. Each cross section in the reservoir was divided into fifty nine numbers of profiles along Y-axis and nine numbers of levels or profiles along Z-axis. So the geometry had 25 x 59 x 9 gridlines i.e. 24 cross sections, 59 profiles along transverse direction and 9 profiles along vertical direction. The co-ordinates of the intersecting points of cells were determined by selecting a reference coordinate origin. Five particles size i.e. 0.007, 0.03, 0.062, 0.1 and 0.15 mm was simulated for flow and settling.

Graphical results were obtained in the form of velocity vectors, horizontal velocities, vertical velocities, sediment concentrations, delta of sediments and sediment flushing of all five particle sizes on map, Longitudinal profiles and X-

sections from variable menu bar. Sediment removal of each particle size from reservoir was extracted from the output file. The numerical simulations was carried out for approximately 600m reach length of the Kohala Hydropower Project, which includes the intake and weir (both spillway and bottom outlet included). The simulation was run for five sediment sizes of 0.007, 0.03, 0.062, 0.1 and 0.15 mm at three flow scenarios of 1000 m^3/s, 2000 m^3/s and 3000 m^3/s. The overall percentage of flushed sediments were 48, 61 and 69 percent respectively and total sediment removed were 59%.